Tennessee Comprehensive Assessment Program
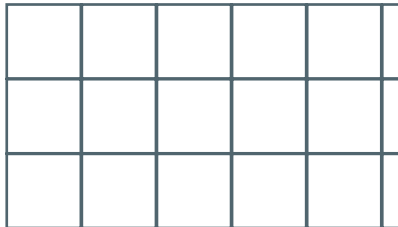
TCAP/CRA 2013

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Task 1   Scoring Guide

Multiplying Mixed Numbers Task

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a.   Label the dimensions of the model.

b.   Find the answer to $5\frac{1}{3}$ × 3.

c.   Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

1. Multiplying Mixed Numbers Task Scoring Guide

The CCSS for Mathematical Content (2 points)

5.NF.4   Calculates the product of $5\frac{1}{3} \times 3$ as 16 or any equivalent of 16 (e.g. $\frac{48}{3}$).

(1 Point)

_____

5.NF.6   Indicates that one more square yard of carpet is needed.

(1 Point)

_____

Total Content Points _____

The CCSS for Mathematical Practice (1 point)

MP4   Labels the dimensions of the array accurately and provides a correct expression to find how much more carpet Tina needs.

(1 Point)

(MP4: Model with mathematics.)

_____

Total Practice Points _____

Total Awarded Points _____

The CCSS for Mathematical Content Addressed in This Task

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

5.NF.4   Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

5.NF.6   Solve real-world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

The CCSS for Mathematical Practice*

1. Make sense of problems and persevere in solving them.

2. Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

5. Use appropriate tools strategically.

6. Attend to precision.

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

*Gray text indicates Mathematical Practices that are not addressed in this task.

Students' responses to a mathematical task provide evidence of what they understand and are able to do in relation to the standards and practices. Across tasks, this cumulative evidence shows students' understanding and abilities within a domain. When students do not respond completely to all parts of a task, they provide insufficient evidence of their mathematical understanding and abilities and therefore do not fully demonstrate the expectations of the standards and practices aligned with that task.

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a. Label the dimensions of the model.

$5\frac{1}{3}$

	1	2	3	4	5	$\frac{1}{3}$
3 yards 2						
3						
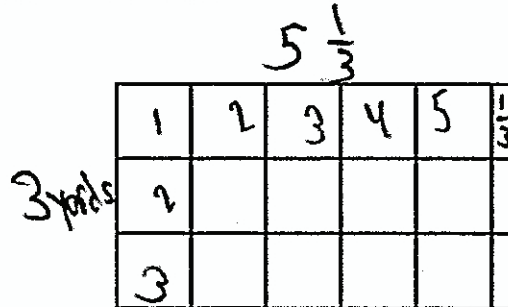
b. Find the answer to $5\frac{1}{3}$ × 3.

> The answer to $5\frac{1}{3}$ × 3 is 16.

c. Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

> $\frac{1}{3}$ ×3 = 1   She only needs
> 1 square yard of
> carpet left.

Guide 1 Litho 579317

Total Content Points: 2 (5.NF.4, 5.NF.6)

Total Practice Points: 1 (MP4)

The student applies previous understandings of multiplication to correctly calculate the product of $5\frac{1}{3} \times 3$ as 16 (5.NF.4). The student writes and solves a multiplication equation $\left(\frac{1}{3} \times 3 = 1\right)$ to represent the real-world problem, and indicates that one additional square yard of carpet is needed (5.NF.6). The student labels the dimensions of the array accurately $\left(5\frac{1}{3} \times 3 \text{ yards}\right)$ and models the situation with an equation $\left(\frac{1}{3} \times 3 = 1\right)$ to find out how much more carpet Tina needs (MP4).
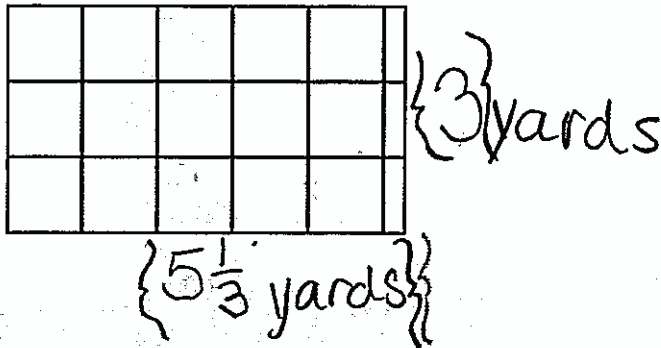
Total Awarded Points: 3 out of 3

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a.   Label the dimensions of the model.

$\}$3 yards

$\{5\frac{1}{3}$ yards$\}$

b.   Find the answer to $5\frac{1}{3}$ × 3.

$5\frac{+15}{\times3}\times3$ $\frac{16}{\times3}{48}$ $3\overline{)48}$

$\frac{16}{3}\times\frac{3}{1}=\frac{48}{3})16$ yards $\frac{16}{3\overline{)48}}$

$\frac{-3}{18}$
$\frac{-18}{}$

16 yards is the answer.

c.   Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

5×3 does equal 15, but the length is $5\frac{1}{3}$ yards × 3 yards and it equals 16 $\{1$ more$\}$ square yard $\{$so she needs$\}$ of the carpet.

Guide 2   Litho 585551

Total Content Points: 2   (5.NF.4, 5.NF.6)

Total Practice Points: 1   (MP4)

The student applies previous understandings of multiplication to correctly calculate the product of $5\frac{1}{3} \times 3$ as 16 (5.NF.4). The student solves the real-world problem by comparing the product of the multiplication equation $5 \times 3 = 15$ to the 16 yards, determining that one more square yard is needed (5.NF.6). The array is labeled correctly $\left(5\frac{1}{3} \text{ yards, 3 yards} \right)$, and the situation is modeled with equations to find how much more carpet Tina needs (MP4).
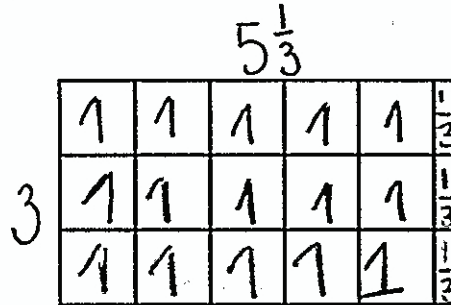
Total Awarded Points: 3 out of 3

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a. Label the dimensions of the model.

$5\frac{1}{3}$

1	1	1	1	1	$\frac{1}{3}$
1	1	1	1	1	$\frac{1}{3}$
1	1	1	1	1	$\frac{1}{3}$

3

b. Find the answer to $5\frac{1}{3}$ × 3.

mixed number   whole number

$5\frac{1}{3} \times 3 = 16$ Answer = 16 yards of carpet

Picture $5\frac{1}{3}$ × 3 = 16

c. Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

$5 \times 3 = 15$. $\frac{1}{3} \times 3 = 1$ 3
$15 + 1 = 16$

She will need 1 more yrd. of carpet because she is forgeting about the 3 $\frac{1}{3}$'s if you x's $\frac{1}{3} \times 3 = 1$ and $15 + 1 = 16$

Litho#: 551743

Guide 3   Litho 551743

Total Content Points: 2   (5.NF.4, 5.NF.6)
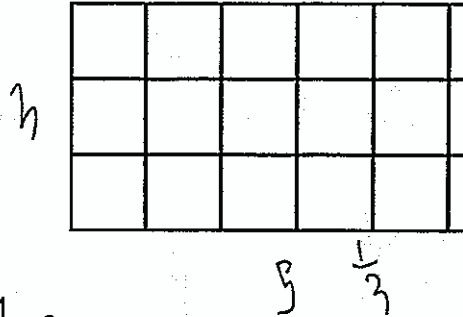
Total Practice Points: 1   (MP4)

The student applies previous understandings of multiplication to correctly calculate the product of $5\frac{1}{3} \times 3$ as 16 (5.NF.4). The student writes and solves a multiplication equation $\left(\frac{1}{3} \times 3 = 1\right)$ to represent the real-world problem and indicates that one more yard of carpet is needed (5.NF.6). The student labels the dimensions of the array accurately $\left(5\frac{1}{3} \times 3\right)$ and models the situation to solve an everyday problem by providing an equation $\left(\frac{1}{3} \times 3 = 1\right)$ to find how much more carpet Tina needs (MP4).

Total Awarded Points: 3 out of 3

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a.   Label the dimensions of the model.

$$\eta$$

$$5 \qquad \frac{1}{3}$$

b.   Find the answer to $5\frac{1}{3}$ × 3.

$$5\frac{1}{3} \times 3 = 16^2 \text{ yards}$$

c.   Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

$$\frac{1}{3} \times 3 = 1 \text{ yard}$$

Guide 4   Litho 565857

Total Content Points: 2   (5.NF.4, 5.NF.6)

Total Practice Points: 1   (MP4)

The student applies previous understandings of multiplication to correctly calculate the product of $5\frac{1}{3} \times 3$ as 16, although the notation used is incorrect (5.NF.4). The student writes and solves a multiplication equation $\left(\frac{1}{3} \times 3 = 1 \right)$ to represent the real-world problem and indicates that one yard of carpet is needed (5.NF.6). The student labels the dimensions of the array accurately $\left(5\frac{1}{3} \times 3 \right)$ and models the situatio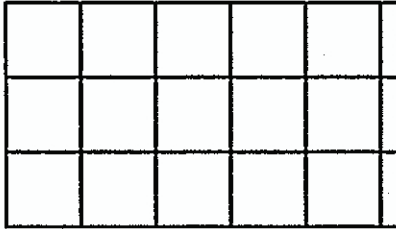n to solve an everyday problem by providing an equation $\left(\frac{1}{3} \times 3 = 1 \right)$ to find how much more carpet Tina needs (MP4).

Total Awarded Points: 3 out of 3

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a.   Label the dimensions of the model.

b.   Find the answer to $5\frac{1}{3}$ × 3.

$5\frac{1}{3} \times 3 = 16$

$5 \times 3 = 15$

$\frac{1}{3} \times 3 = 1$

16 square feet of carpet

c.   Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

You already have 5 × 3, so you can do $\frac{1}{3} \times 3$.

$\frac{1}{3} \times 3 = 1$ square foot needed

Litho#: 581008

Guide 5 Litho 581008

Total Content Points: 2 (5.NF.4, 5.NF.6)

Total Practice Points: 0

The student applies previous understandings of multiplication to correctly calculate the product of $5\frac{1}{3}\times 3$, summing the products of 5×3 and $\frac{1}{3}\times 3$ to get 16 (5.NF.4). Even though the unit label is incorrectly expressed as feet instead of yards, the student writes and accurately solves the equation $\left(\frac{1}{3}\times 3 = 1\right)$ to represent the real-world problem involving multiplication (5.NF.6).
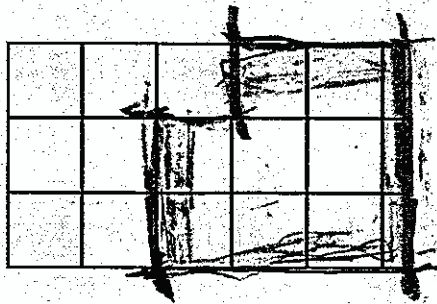
Although the student models the situation correctly with the equation $\left(\frac{1}{3}\times 3 = 1\right)$, the dimensions for the array are not given (no credit for MP4).

Total Points Awarded: 2 out of 3

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a.   Label the dimensions of the model.

b.   Find the answer to $5\frac{1}{3}$ × 3.

c.   Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

1 square yard

Litho#: 568811

Guide 6   Litho 568811

Total Content Points: 2   (5.NF.4, 5.NF.6)

Total Practice Points: 0

The student applies previous understandings of multiplication to correctly find the product of $5\frac{1}{3} \times 3$ as 16, although no work is shown (5.NF.4). The student indicates that 1 more yard of carpet is needed, solving the real-world problem (5.NF.6). The dimensions are not labeled on the array, and the student does not model the situation with an equation or diagram to find how much more carpet Tina needs (no credit for MP4).
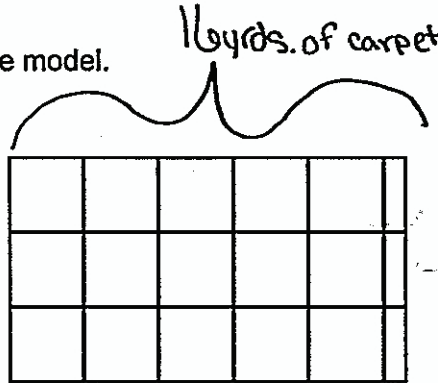
Total Awarded Points: 2 out of 3

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a.   Label the dimensions of the model.

16 yrds. of carpet

b.   Find the answer to $5\frac{1}{3} \times 3$.

$5\frac{1}{3} = \frac{16}{3} \times \frac{3}{1} = \frac{48}{3} = 16$ yrds. of carpet

c.   Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

5 yrds. — Not the carpet she really wants.

16 yrds. — The carpet she really needs

5 yrds. of carpet × 3 yrds. of carpet = 15 yrds. of carpet

$5\frac{1}{3}$ yrds. of carpet × 3 yrds. of carpet = 16 yrds. of carpet

Litho#: 578062

Guide 7   Litho 578062

Total Content Points: 1   (5.NF.4)
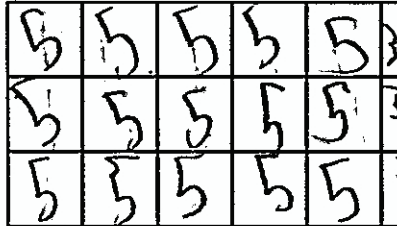
Total Practice Points: 0

The student applies previous understandings of multiplication to correctly calculate the product

of $5\frac{1}{3} \times 3$ as 16 (5.NF.4). The student does not provide a multiplication equation to represent the

real-world problem and does not indicate that one square yard is needed (no credit for 5.NF.6).
Dimensions are not labeled on the array, and the student does not model the situation with an
equation to find how much more carpet Tina needs (no credit for MP4).

Total Awarded Points: 1 out of 3

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a.   Label the dimensions of the model.

$$\begin{array}{|c|c|c|c|c|c|}
\hline
5 & 5 & 5 & 5 & 5 & 3 \\
\hline
5 & 5 & 5 & 5 & 5 & 3 \\
\hline
5 & 5 & 5 & 5 & 5 & 3 \\
\hline
\end{array}$$

b.   Find the answer to $5\frac{1}{3} \times 3$.

$$\left(5\frac{1}{3}\right) \times 3$$

$$\frac{16 \times 3}{3} = \frac{48}{3}$$

c.   Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

$$15 \times 3 = 96$$

Guide 8   Litho 565837

Total Content Points: 1   (5.FN.4)

Total Practice Points: 0

The student applies previous understandings of multiplication to correctly multiply the expression, $5\frac{1}{3} \times 3 = \frac{48}{3}$, which is a representation of 16 (5.NF.4). The student never indicates that one more square yard of carpet is needed, neither using visual fraction models nor using equations to represent the problem (no credit for 5.NF.6). No dimensions for the array are given, nor does the student provide a correct expression to find how much more carpet Tina needs. The student does not label the array correctly, and the equation in Part C does not correctly model the remaining carpet needed (no credit for MP4).

Total Awarded Points: 1 out of 3

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a. Label the dimensions of the model.

units

1	4	7	10	13 $\frac{1}{3}$
2	5	8	11	14 $\frac{2}{3}$
3	6	9	12	15 $\frac{3}{3}$ = 1 whole

$$\begin{array}{r} 15 \\ +\ 1 \\ \hline 16 \end{array}$$

b. Find the answer to $5\frac{1}{3}$ × 3.

$5\frac{1}{3}×3 = \ =7$ $5×3=\boxed{15}$

$5\frac{15}{3}$

rounds to! ⑤ (nothing)

c. Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

$5×3=15+1=\boxed{16}$

So she needs one more than fifteen.

Guide 9   Litho 584369

Total Content Points: 1   (5.NF.6)

Total Practice Points: 0

The student does not apply and extend previous understandings of multiplication to correctly arrive at the product of 16 (no credit for 5.NF.4). The student does solve the real-world problem by using the multiplication equation $5 \times 3 = 15$ and by stating that one more than fifteen is needed (5.NF.6). Dimensions are not correctly labeled on the array, and the student does not model with an equation to find how much more carpet Tina needs (no credit for MP4).
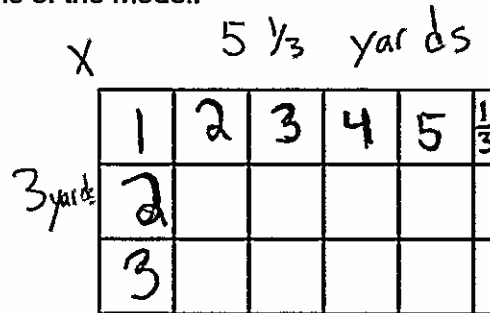
Total Awarded Points: 1 out of 3

Task 1. Multiplying Mixed Numbers Task

Tina wants to buy carpet for her room. Her room is $5\frac{1}{3}$ yards × 3 yards. She draws the area model below to represent her room.

a.   Label the dimensions of the model.

X   5 ⅓ yards

	1	2	3	4	5	$\frac{1}{3}$
3yards 2						
3						

b.   Find the answer to $5\frac{1}{3}$ × 3.

5 × 3 = 15 yards 5 × ⅓ = 5 yards

Tina's room is 5 yards.

c.   Tina says, "I can see 5 × 3 in the model, so I'll buy 15 square yards of carpet. But how much more carpet do I need?"

Write a multiplication equation to find how much more carpet Tina needs.

15 × ⅓ = 5

Tina will need 5⅜ pieces of carpet.

Guide 10   Litho 572445

Total Content Points: 0

Total Practice Points: 0

The student does not apply and extend previous understandings of multiplication to correctly arrive at the product of 16 (no credit for 5.NF.A.4). There is no evidence that student is able to solve real-world problems involving multiplication of mixed numbers to determine that one more yard of carpet is needed (no credit for 5.NF.A.6). Dimensions are labeled correctly on the array. However, in Part B the student does not model the situation with an equation to find out how much more carpet Tina needs (no credit for MP4).

Total Awarded Points: 0 out of 3